IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Forrest Frank Hopkins et al.	§ § §	Group Art Unit:	2882
Serial No.: 10/743,195	§ §	Examiner:	Song, Hoon K.
Filed: December 22, 2003	§ §	Confirmation No.:	6880
For: SYSTEM AND METHOD FOR DETECTING AN OBJECT	§ § §	Atty. Docket:	139681-2/YOD/SIN GERD:0708

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March 10, 2008	/Patrick S. Yoder/
Date	Patrick S. Yoder

APPEAL BRIEF PURSUANT TO 37 C.F.R. §§ 41.31 AND 41.37

This Appeal Brief is being filed in furtherance to the Notice of Appeal filed electronically on January 25, 2008.

The Commissioner is authorized to charge the requisite fee of $510.00, and any additional fees which may be necessary to advance prosecution of the present application, to Account No. 07-0868; Order No. 139681-2/YOD (GERD:0708).

1. **REAL PARTY IN INTEREST**

The real party in interest is General Electric Company, the Assignee of the above-referenced application by virtue of the Assignment to General Electric Company, recorded at reel 015033, frame 0721, and dated March 4, 2004. Accordingly, General Electric Company, as the parent company of the Assignee of the above-referenced application, will be directly affected by the Board's decision in the pending appeal.

2. **RELATED APPEALS AND INTERFERENCES**

The present application was subject to an Appeal filed on August 16, 2006. Along with the Notice commencing that procedure, a "Pre-Appeal Brief Request for Review" was filed. That Appeal resulted in the Examiner reopening prosecution without further briefing or review by the Board.

3. **STATUS OF CLAIMS**

Claims 1, 3-21, and 23-72 are currently pending and under final rejection and, thus, are the subject of this appeal.

4. **STATUS OF AMENDMENTS**

All amendments in relation to the claims of the present patent application have been entered, and no amendments have been submitted or entered subsequent to the Final Office Action mailed on October 31, 2007.

5. **SUMMARY OF CLAIMED SUBJECT MATTER**

The invention relates generally to the detection of objects located within articles. *See, e.g.,* Application, paragraph 2. More particularly, the invention relates to techniques that can be used for the detection of objects considered illegal or dangerous for transport in luggage or mail parcels. *See, e.g., id.* Specifically, embodiments of the present invention include an acquisition subsystem (*e.g.,* 30) including an X-ray computed tomography scanner (*e.g.,* 430) having *stationary* radiation sources and detectors

arranged concentrically around a conveyer belt (*e.g.,* 46) allowing articles (*e.g.,* 22) to be conveyed *through* the X-ray computed tomography scanner (*e.g.,* 430). *See, e.g., id.,* paragraph 23; figure 3. The ability to convey articles (*e.g.,* 22) *through* the X-ray computed tomography scanner (*e.g.,* 430) allows for higher throughput of articles (*e.g.,* 22) than for scanners utilizing rotating gantries, primarily since there is a reduction in moving parts. *See, e.g., id.,* paragraph 24.

The Application contains six independent claims, namely, claims 1, 21, 41, 48, 58, and 68, all of which are the subject of this appeal. The subject matter of these claims is summarized below.

With regard to the aspect of the invention set forth in independent claim 1, discussions of the recited features of claim 1 can be found at least in the below cited locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 1 relates to a system (*e.g.*, 10) for detecting an explosive within an article (*e.g.*, 22). *See, e.g., id.,* paragraphs 20, 22, 23, 27, 30, and 32; figures 1 and 2. The system (*e.g.*, 10) includes an acquisition subsystem (*e.g.*, 30) which further includes an X-ray computed tomography scanner (*e.g.*, 330, 430) having a stationary radiation source and a stationary detector. *See, e.g., id.,* paragraphs 22 and 23; figures 1-4. The acquisition subsystem (*e.g.*, 30) is adapted to acquire intensity measurements pertaining to the explosive. *See, e.g., id.,* paragraphs 23, 28, 35, and 43. The system (*e.g.*, 10) further includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5. The system (*e.g.*, 10) also includes a reconstruction subsystem (*e.g.*, 80), in communication with the acquisition subsystem (*e.g.*, 30), for generating view data (*e.g.*, 200) from the intensity measurements and for reconstructing the view data (*e.g.*, 200) into image data (*e.g.*, 212) representative of the explosive. *See, e.g., id.,* paragraphs 22, 23, 28, 30, 32, 35, and 43; figures 1, 2, 5, and 6. The reconstruction subsystem (*e.g.*, 80) utilizes three-dimensional reconstruction techniques. *See, e.g., id.,* paragraphs 33, 35, and 43. In addition, the acquisition subsystem (*e.g.*, 30) acquires image data (*e.g.*, 212)

of the articles (*e.g.*, 22) for three-dimensional reconstruction without rotating the articles (*e.g.*, 22). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5.

With regard to the aspect of the invention set forth in independent claim 21, discussions of the recited features of claim 21 can be found at least in the below cited locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 21 relates to a system (*e.g.*, 10) for detecting an explosive within an article (*e.g.*, 22). *See, e.g., id.,* paragraphs 20, 22, 23, 27, 30, and 32; figures 1 and 2. The system (*e.g.*, 10) includes a transportation means (*e.g.*, 46) for transporting the article (*e.g.*, 22) without rotating the article (*e.g.*, 22). *See, e.g., id.,* paragraphs 22 and 23; figures 1-3. Further, the system (*e.g.*, 10) includes an acquisition subsystem (*e.g.*, 30) which further includes an X-ray computed tomography scanning device (*e.g.*, 330, 430) having a stationary radiation source and a stationary detector. *See, e.g., id.,* paragraphs 22 and 23; figures 1-4. The acquisition subsystem (*e.g.*, 30) is adapted to acquire intensity measurements from which view data (*e.g.*, 200) may be derived. *See, e.g., id.,* paragraphs 23, 28, 35, and 43. The system (*e.g.*, 10) also includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.,* paragraphs 22 and 23; figures 1-4. The system (*e.g.*, 10) further includes a reconstruction subsystem (*e.g.*, 80), including a plurality of reconstruction stages (*e.g.*, 84, 86, 88), for reconstructing the view data (*e.g.*, 200) into image data (*e.g.*, 212) representative of the explosive. *See, e.g., id.,* paragraphs 22, 23, 28, 30, 32, 35, and 43; figures 1, 2, 5, and 6. The reconstruction subsystem (*e.g.*, 80) utilizes three-dimensional reconstruction techniques. *See, e.g., id.,* paragraphs 33, 35, and 43. The system (*e.g.*, 10) also includes a computer-aided detection subsystem (*e.g.*, 100), including a plurality of computer-aided detection stages (*e.g.*, 108, 110, 112), for analyzing the image data (*e.g.*, 212). *See, e.g., id.,* paragraphs 21, 27-31, 35, 38, 42, 43, 45, and 46; figures 1, 2, and 6.

With regard to the aspect of the invention set forth in independent claim 41, discussions of the recited features of claim 41 can be found at least in the below cited

locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 41 relates to a system (*e.g.*, 10) for detecting an explosive within an article (*e.g.*, 22). *See, e.g., id.,* paragraphs 20, 22, 23, 27, 30, and 32; figures 1 and 2. The system (*e.g.*, 10) includes an acquisition subsystem (*e.g.*, 30) including an X-ray computed tomography scanner (*e.g.*, 330, 430) for acquiring intensity measurements pertaining to the explosive. *See, e.g., id.,* paragraphs 22 and 23; figures 1-4. The system (*e.g.*, 10) also includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.,* paragraphs 22 and 23; figures 1-4. Further, the system (*e.g.*, 10) includes a reconstruction subsystem (*e.g.*, 80), in communication with the acquisition subsystem (*e.g.*, 30), for generating view data (*e.g.*, 200) from the intensity measurements and for reconstructing the view data (*e.g.*, 200) into image data (*e.g.*, 212). *See, e.g., id.,* paragraphs 22, 23, 28, 30, 32, 35, and 43; figures 1, 2, 5, and 6. The reconstruction subsystem (*e.g.*, 80) utilizes three-dimensional reconstruction techniques. *See, e.g., id.,* paragraphs 33, 35, and 43. The system (*e.g.*, 10) also includes a computer-aided detection subsystem (*e.g.*, 100) for analyzing the image data (*e.g.*, 212). *See, e.g., id.,* paragraphs 21, 27-31, 35, 38, 42, 43, 45, and 46; figures 1, 2, and 6. The system (*e.g.*, 10) further includes at least one additional source (*e.g.*, 60) of information pertaining to the explosive. *See, e.g., id.,* paragraph 27; figures 1 and 2. The image data (*e.g.*, 212) and the additional sources (*e.g.*, 60) of information assist in identifying the explosive. *See, e.g., id.* In addition, the acquisition subsystem (*e.g.*, 30) acquires image data (*e.g.*, 212) of the articles (*e.g.*, 22) for three-dimensional construction without rotating the articles (*e.g.*, 22). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5.

With regard to the aspect of the invention set forth in independent claim 48, discussions of the recited features of claim 48 can be found at least in the below cited locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 48 relates to a method for detecting an explosive within an article (*e.g.*, 22). *See, e.g., id.,* paragraphs 42-46; figures 6 and 7. The method includes acquiring information pertaining to the explosive with an acquisition apparatus (*e.g.*, 30)

having an X-ray computed tomography scanner (*e.g.*, 330, 430) with a stationary radiation source and a stationary detector. *See, e.g., id.,* paragraphs 22 and 23; figures 1-4, and 6. The method further includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5. The method also includes reconstructing an image representative of the explosive based upon the acquired information. *See, e.g., id.,* paragraphs 43, 44, and 46; figures 6 and 7. The image reconstruction includes reconstructing the acquired information into a three-dimensional image. *See, e.g., id.* In addition, the acquisition subsystem (*e.g.*, 30) acquires image data (*e.g.*, 212) of the articles (*e.g.*, 22) for three-dimensional reconstruction without rotating the articles (*e.g.*, 22). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5.

With regard to the aspect of the invention set forth in independent claim 58, discussions of the recited features of claim 58 can be found at least in the below cited locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 58 relates to a method for detecting an explosive within an article (*e.g.*, 22). *See, e.g., id.,* paragraphs 42-46; figures 6 and 7. The method includes acquiring information pertaining to an object located within the article (*e.g.*, 22) with an X-ray computed tomography machine (*e.g.*, 330, 430) having a stationary radiation source and a stationary detector. *See, e.g., id.,* paragraphs 22 and 23; figures 1-4, and 6. The method further includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.,* paragraphs 22 and 23; figures 3-5. The method also includes communicating the acquired information to a plurality of reconstruction modules (*e.g.*, 84, 86, 88). *See, e.g., id.,* paragraphs 43, 44, and 46; figure 6. Further, the method includes reconstructing the acquired information into image data (*e.g.*, 212) with the plurality of reconstruction modules (*e.g.*, 84, 86, 88). *See, e.g., id.,* paragraphs 43, 44, and 46; figures 6 and 7. The reconstruction includes reconstructing the acquired information into a three-dimensional image. *See, e.g., id.* The method also includes analyzing the image data (*e.g.*, 212) to identify whether the object is an explosive device. *See, e.g., id.,* paragraph 35. The

acquisition subsystem (*e.g.*, 30) acquires image data (*e.g.*, 212) of the articles (*e.g.*, 22) for three-dimensional reconstruction without rotating the articles (*e.g.*, 22). *See, e.g., id.*, paragraphs 22 and 23; figures 3-5.

With regard to the aspect of the invention set forth in independent claim 68, discussions of the recited features of claim 68 can be found at least in the below cited locations of the specifications and drawings. By way of example, an embodiment in accordance with claim 68 relates to a method for detecting an object. The method includes scanning an article (*e.g.*, 22) with an X-ray computed tomography machine (*e.g.*, 330, 430) to acquire information pertaining to the object. *See, e.g., id.*, paragraphs 22 and 23; figures 1-4, and 6. The computed tomography machine (*e.g.*, 330, 430) includes a stationary radiation source and a stationary detector. *See, e.g., id.* The method further includes a means (*e.g.*, 46) for conveying articles (*e.g.*, 22) to be scanned through the computed tomography scanner (*e.g.*, 330, 430). *See, e.g., id.*, paragraphs 22 and 23; figures 3-5. The method also includes discriminating between high-energy and low-energy signatures. *See, e.g., id.*, paragraphs 25, 26, and 45. Further, the method includes reconstructing image data (*e.g.*, 212) representative of the object based upon the high-energy and low-energy signatures. *See, e.g., id.*, paragraphs 43, 44, and 46; figures 6 and 7. The image reconstruction includes reconstructing the information derived from the high-energy and low-energy signatures into a three-dimensional image. *See, e.g., id.* The method also includes analyzing the reconstructed image to identify the object. *See, e.g., id.*, paragraph 35. The acquisition subsystem acquires image data (*e.g.*, 212) of the articles (*e.g.*, 22) for three-dimensional reconstruction without rotating the articles (*e.g.*, 22). *See, e.g., id.*, paragraphs 22 and 23; figures 3-5.

A benefit or the present invention is that the acquisition subsystem (*e.g.*, 30) includes an X-ray computed tomography scanner (*e.g.*, 430) having *stationary* radiation sources and detectors. *See, e.g., id.*, paragraph 23; figures 4a and 4b. The X-ray computed tomography scanner (*e.g.*, 430) includes a source ring (*e.g.*, 433) including distributed electron field emission devices (*e.g.*, 434). *See, e.g., id.* The X-ray computed

tomography scanner (*e.g.,* 430) further includes a detector ring (*e.g.,* 436) adjacent to the source ring (*e.g.,* 433). *See, e.g., id.* The detector ring (*e.g.,* 436) includes a plurality of discrete detector modules (*e.g.,* 437). *See, e.g., id.* Each of the electron field emission devices (*e.g.,* 434) sends an electron beam (*e.g.,* 440) to a target ring (*e.g.,* 435), which produces a fan-like beam of X-rays (*e.g.,* 40) toward an article (*e.g.,* 22) on the conveyor belt (*e.g.,* 46). *See, e.g., id.* The X-rays (*e.g.,* 40) travel through the article (*e.g.,* 22), are attenuated to some extent by the contents of the article (*e.g.,* 22), and impinge upon one or more of the discrete detector modules (*e.g.,* 437). *See, e.g., id.* The detector modules (*e.g.,* 437) form intensity measurements from the X-rays (*e.g.,* 40), which are then generated into a measured sinogram, or view data (*e.g.,* 200), and the view data (*e.g.,* 200) is then communicated to the reconstruction subsystem (*e.g.,* 80). *See, e.g., id.*

An advantage of such an X-ray computed tomography scanner (*e.g.,* 430) having *stationary* radiation sources and detectors arranged concentrically around the conveyer belt (*e.g.,* 46) is that the articles (*e.g.,* 22) may be conveyed *through* the X-ray computed tomography scanner (*e.g.,* 430). As stated above, the ability to convey articles (*e.g.,* 22) to be scanned *through* the X-ray computed tomography scanner (*e.g.,* 430) allows for higher throughput of articles (*e.g.,* 22) than for scanners utilizing rotating gantries, primarily since there is a reduction in moving parts. *See, e.g., id.,* paragraph 24.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Sole Ground of Rejection for Review on Appeal:

Appellants respectfully urge the Board to review and reverse the Examiner's sole ground of rejection in which the Examiner rejected claims 1, 3-21, and 23-72 under U.S.C. § 103(a) as being unpatentable over Saha (U.S. Patent No. 6,130,929, hereinafter "Saha") in view of Hiraoglu et al. (U.S. Patent No. 6,272,230, hereinafter "Hiraoglu"), with various dependent claims being rejected in view of these references and additional secondary references. Appellants note, however, that all of the independent claims 1, 21, 41, 48, 58, and 68 were rejected only in view of the Saha and Hiraoglu combination.

7. ARGUMENT

As discussed in detail below, the Examiner has improperly rejected the pending claims. Specifically, the Examiner has misapplied long-standing and binding legal precedents and principles in rejecting the claims under 35 U.S.C. § 103. Accordingly, Appellants respectfully request full and favorable consideration by the Board, and reversal of the outstanding rejections.

A. Legal Precedent

The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). In addressing obviousness determinations under 35 U.S.C. § 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.,* 383 U.S. 1 (1966). In *KSR*, the Court also reaffirmed that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *Id.* at 14. In this regard, the *KSR* court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does ... because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *Id.* at 14-15. In *KSR*, the court noted that the demonstration of a teaching, suggestion, or motivation to combine provides a "helpful insight" in determining whether claimed subject matter is obvious. *KSR, slip op.* at 14.

Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 ("To facilitate review, this analysis should be made explicit. See *In re Kahn,* 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal

conclusion of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ."); s*ee also, In re Lee,* 61 U.S.P.Q.2d 1430, 1436 (Fed. Cir. 2002) (holding that the factual inquiry whether to combine references must be thorough and searching, and that it must be based on *objective evidence of record*).

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988). One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). The Federal Circuit has warned that the Examiner must not, "fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher." *In re Dembiczak*, F.3d 994, 999, 50 U.S.P.Q.2d 52 (Fed. Cir. 1999) (quoting *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553, 220 U.S.P.Q. 303, 313 (Fed. Cir. 1983)).

It is improper to combine references where the references teach away from their combination. *In re Grasselli*, 713 F.2d 731, 743, 218 U.S.P.Q. 769, 779 (Fed. Cir. 1983); M.P.E.P. § 2145. Moreover, if the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 U.S.P.Q. 349 (CCPA 1959); *see* M.P.E.P. § 2143.01(VI). If the proposed modification or combination would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984); *see* M.P.E.P. § 2143.01(V).

B. **Description of the Present Invention**

As discussed above, the present invention includes an acquisition subsystem (*e.g.*, 30) including an X-ray computed tomography scanner (*e.g.*, 430) having *stationary* radiation sources and detectors. *See, e.g.*, Application, paragraph 23; figures 4a and 4b. The X-ray computed tomography scanner (*e.g.*, 430) includes a source ring (*e.g.*, 433) including distributed electron field emission devices (*e.g.*, 434). *See, e.g., id.* The X-ray computed tomography scanner (*e.g.*, 430) further includes a detector ring (*e.g.*, 436) adjacent to the source ring (*e.g.*, 433). *See, e.g., id.* The detector ring (*e.g.*, 436) includes a plurality of discrete detector modules (*e.g.*, 437). *See, e.g., id.* Each of the electron field emission devices (*e.g.*, 434) sends an electron beam (*e.g.*, 440) to a target ring (*e.g.*, 435), which produces a fan-like beam of X-rays (*e.g.*, 40) toward an article (*e.g.*, 22) on the conveyor belt (*e.g.*, 46). *See, e.g., id.* The X-rays (*e.g.*, 40) travel through the article (*e.g.*, 22), are attenuated to some extent by the contents of the article (*e.g.*, 22), and impinge upon one or more of the discrete detector modules (*e.g.*, 437). *See, e.g., id.* The detector modules (*e.g.*, 437) form intensity measurements from the X-rays (*e.g.*, 40), which are then generated into a measured sinogram, or view data (*e.g.*, 200), and the view data (*e.g.*, 200) is then communicated to the reconstruction subsystem (*e.g.*, 80). *See, e.g., id.*

As stated above, an advantage of such an X-ray computed tomography scanner (*e.g.*, 430) having *stationary* radiation sources and detectors arranged concentrically around the conveyer belt (*e.g.*, 46) is that the articles (*e.g.*, 22) may be conveyed *through* the X-ray computed tomography scanner (*e.g.*, 430). The ability to convey articles (*e.g.*, 22) to be scanned *through* the X-ray computed tomography scanner (*e.g.*, 430) allows for higher throughput of articles (*e.g.*, 22) than for scanners utilizing rotating gantries, primarily since there is a reduction in moving parts. *See, e.g., id.*, paragraph 24.

C. **Description of the Saha and Hiraoglu References**

Saha discloses an electron beam computed tomography scanning system (*e.g.*, 8) which includes a vacuum housing chamber (*e.g.*, 10) wherein an electron beam (*e.g.*, 12)

is generated along a z-axis (*e.g.,* 32) at an end of the system (*e.g.,* 8) opposite another end of the system into which a patient (*e.g.,* 20) is positioned. *See, e.g.,* Saha, column 4, lines 33-36; figure 2A. The electron beam (*e.g.,* 12) is directed through a beam optics assembly (*e.g.,* 13) to scan a circular target (*e.g.,* 14) which is arranged around the z-axis (*e.g.,* 32). *See, e.g., id.,* column 4, lines 36-38; figure 2A. Upon being struck by the electron beam (*e.g.,* 12), the circular target (*e.g.,* 14) emits a fan-like beam of X-rays (*e.g.,* 18) that passes through a region of a patient (*e.g.,* 20) lying within a reconstruction circle (*e.g.,* 15). *See, e.g., id.,* column 4, lines 38-43; figure 2A. These X-rays (*e.g.,* 18) then register upon a region of a detector array (*e.g.,* 22) located generally diametrically opposite. *See, e.g., id.,* column 4, lines 43-44; figure 2A. The detector array (*e.g.,* 22) outputs data to a computer processing system (*e.g.,* 24) that processes and records the data. *See, e.g., id.,* column 4, lines 45-47; figure 2A. While the source does not move in Saha, it must also be observed that an article ***cannot move through the scanner***. That is, because the electron beam (*e.g.,* 12) is positioned directly on the axis of the scanner itself (*see*, z-axis 32 in FIG. 2A), an article to be scanned cannot be transported *through* the scanner as required by independent claims 1, 21, 41, 48, 58, and 68.

In contrast, Hiraoglu discloses a system (*e.g.,* 100) including a conveyor system (*e.g.,* 110) for conveying luggage (*e.g.,* 112) through a central aperture (*e.g.,* 126) of a computed tomography scanning system (*e.g.,* 120). *See, e.g.,* Hiraoglu, column 14, lines 30-33; figures 1-3. The computed tomography scanning system (*e.g.,* 120) includes an annular shaped rotating platform (*e.g.,* 124) disposed within a gantry support (*e.g.,* 125) for rotation about a rotation axis (*e.g.,* 127) that is parallel to the direction of travel (*e.g.,* 114) of the luggage (*e.g.,* 112). *See, e.g., id.,* column 14, lines 38-42; figures 1-3. The rotating platform (*e.g.,* 124) defines a central aperture (*e.g.,* 126) through which the conveyor system (*e.g.,* 110) transports the luggage (*e.g.,* 112). *See, e.g., id.,* column 14, lines 49-51; figures 1-3. The computed tomography scanning system (*e.g.,* 120) also includes an X-ray tube (*e.g.,* 128) and a detector array (*e.g.,* 130) which are disposed on diametrically opposite sides of the rotating platform (*e.g.,* 124). *See, e.g., id.,* column 14, lines 52-54; figures 1-3. The computed tomography scanning system (*e.g.,* 120) further

includes a data acquisition system (*e.g.,* 134) for receiving and processing computed tomography data signals generated by the detector array (*e.g.,* 130). *See, e.g., id.,* column 14, lines 58-61; figures 1-3. While luggage (*e.g.,* 112) is transported through the computed tomography scanning system (*e.g.,* 120) in Hiraoglu, it must be observed that the computed tomography scanning system (*e.g.,* 120) does not include *stationary radiation sources and detectors*, as required by independent claims 1, 21, 41, 48, 58, and 68. Rather, the computed tomography scanning system (*e.g.,* 120) includes a *rotating* platform (*e.g.,* 124) disposed within a gantry support (*e.g.,* 125) which allows for *rotation* about a *rotation* axis (*e.g.,* 127).

D. **The combination of Saha and Hiraoglu is nonobvious as the combination is not reasonably likely to succeed.**

The combination of Saha and Hiraoglu cannot render the claims obvious at least in view of the fact that articles that would be scanned in a resulting system **could not possibly move *through* the scanner** as required by independent claims 1, 21, 41, 48, 58, and 68.

Appellants submit that the Saha scanner is simply not combinable with the system of Hiraoglu. That is, Hiraoglu teaches a *rotational* computed tomography scanning system through which luggage is intended to be conveyed. Replacing that scanner with the scanner of Saha would render the device ***inoperative*** insomuch as a conveyor could not possibly move articles *through* the Saha scanner due to the presence of the electron beam (*e.g.,* 12) along the scanner z-axis (*e.g.,* 32). *See, e.g.,* Saha, figure 2A. More specifically, Figure 2A of Saha depicts a design where the electron beam (*e.g.,* 12) generation occurs directly behind and in line with the acquisition subsystem, precluding the transportation of articles *through the scanner* as claimed. *See, e.g., id.* This transportation is necessary to achieve the high throughput, such as for rapid scanning of thousands of pieces of luggage or parcels. *See, e.g.,* Application, paragraph 4. Thus, in the hypothetical combination, Saha would simply be incapable of accomplishing these

functions. *See* MPEP 2143.01 (stating that a *prima facie* case of obviousness requires a reasonable likelihood of success).

In the Advisory Action mailed on January 23, 2008, the Examiner disagreed with these arguments, stating:

> The applicant's arguments against the references individually, [sic] one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. It is agreed that patient of the Saha reference cannot completely move through the scanner, however when an article such as Hiraoglu's luggage 112 is placed on the [sic] Saha's system, the article would move through the scanner. Accordingly, the combination of Saha and Hiraoglu would teaches [sic] the claimed limitation and the applicant's argument is not persuasive.
>
> Advisory Action mailed on January 23, 2008, page 2.

Appellants refute the Examiner's contention that Saha and Hiraoglu have been treated individually and not in combination. It is the Appellants' position that the proposed *combination* is not reasonable. Whether the rotating computed tomography system of Hiraoglu is combined with the couch system of Saha or the stationary-source tomography system of Saha is combined with the conveyer belt system of Hiraoglu, neither combination would render independent claims 1, 21, 41, 48, 58, and 68 obvious and be reasonably likely to succeed. In the former case, the combination would not include *stationary radiation sources and detectors*. In the latter case, the combination would not allow for scanned objects to move *through* the computed tomography system.

Furthermore, Appellants are unable to follow the Examiner's logic as to how either combination would be likely to succeed. The Examiner appears to argue that if luggage were placed on the couch system of Saha, it would somehow be able to move *through* the scanner. However, Appellants still contend that because the radiation source in Saha is located on the z-axis of the scanner, it would still be impossible to move the luggage *through* the scanner. Because Saha *combined with* Hiraoglu has no reasonable

likelihood of success for the claimed transport *through* the scanner, the Examiner has not established a *prima facie* case of obviousness.

Appellants further note that the secondary references relied upon by the Examiner do nothing to obviate the deficiencies of the primary references in regard to the features recited in the independent claims. In particular, the secondary references do not teach any solution that would allow Saha and Hiraoglu to be combined such that articles to be scanned for explosives can be moved *through* a stationary-source computed tomography system. Accordingly, the various dependent claims are also believed to be clearly patentable over the cited references.

For at least these reasons, the Examiner has clearly failed to establish a *prima facie* case of obviousness with regard to independent claims 1, 21, 41, 48, 58, and 68, as well as for the claims depending therefrom. Accordingly, Appellants request the Board reverse the rejections and allow all pending claims.

Conclusion

Appellants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner or Board wishes to resolve any other issues by way of a telephone conference, the Examiner or Board is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

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8. APPENDIX OF CLAIMS ON APPEAL

Listing of Claims:

1. A system for detecting an explosive within an article, comprising:

an acquisition subsystem including an x-ray computed tomography scanner having a stationary radiation source and a stationary detector, said acquisition subsystem is adapted to acquire intensity measurements pertaining to the explosive;

a means for conveying articles to be scanned through the computed tomography scanner; and

a reconstruction subsystem, in communication with the acquisition subsystem, for generating view data from the intensity measurements and for reconstructing the view data into image data representative of the explosive, wherein said reconstruction subsystem utilizes three - dimensional reconstruction techniques;

wherein the acquisition subsystem acquires image data of the articles for three dimensional reconstruction without rotating the articles.

3. The system of claim 1, wherein the computed tomography scanner comprises:

a vacuum housing chamber for generating an electron beam;

a target for receiving the electron beam and emitting x-rays in response to the electron beam; and

a detector array located opposite the target for receiving the emitted x-rays.

4. The system of claim 1, wherein the computed tomography scanner comprises:

a source ring including a plurality of stationary x-ray sources; and

a detector ring adjacent to the source ring and including a plurality of discrete detector modules.

5. The system of claim 1, wherein the reconstruction subsystem comprises a plurality of reconstruction stages.

6. The system of claim 5, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to reduce artifacts in the image data.

7. The system of claim 5, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to vary the voxel size in the image data.

8. The system of claim 5, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to compensate for noise in the acquired information.

9. The system of claim 5, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to iteratively and statistically reconstruct the image data.

10. The system of claim 5, further comprising a computer-aided detection subsystem for analyzing the image data.

11. The system of claim 10, wherein the computer-aided detection subsystem comprises a plurality of computer-aided detection stages.

12. The system of claim 11, wherein at least one of the plurality of computer-aided detection stages is in communication with any of the plurality of reconstruction stages.

13. The system of claim 12, wherein at least one computer-aided detection stage is adapted to receive the image data from one of the reconstruction stages, analyze the image data, and identify an area of interest within the image data.

14. The system of claim 13, wherein the computer-aided detection subsystem is adapted to feedback image data of the area of interest to the reconstruction subsystem.

15. The system of claim 1, wherein the acquisition subsystem comprises an energy discriminating detector adapted to acquire energy sensitive measurements.

16. The system of claim 15, wherein the energy discriminating detector includes an assembly of two or more x-ray attenuating materials the signals from which can be processed in either a photon counting or a charge integration mode.

17. The system of claim 1, wherein the acquisition subsystem comprises at least one detector for detecting x-rays from at least two different incident x-ray energy spectra.

18. The system of claim 1, further comprising an alternative modality subsystem.

19. The system of claim 18, wherein the alternative modality subsystem comprises one or more of the group consisting of a coherent scattering subsystem, a quadrupole subsystem, and a trace detection subsystem.

20. The system of claim 1, further comprising a conveyor belt for transporting the article to the acquisition subsystem.

21. A system for detecting an explosive within an article, comprising:

a transportation means for transporting the article without rotating the article;

an acquisition subsystem comprising an x-ray computed tomography scanning device having a stationary radiation source and a stationary detector and being adapted to acquire intensity measurements from which view data may be derived;

a means for conveying articles to be scanned through the computed tomography scanner;

a reconstruction subsystem, comprising a plurality of reconstruction stages, for reconstructing the view data into image data representative of the explosive, wherein said reconstruction subsystem utilizes three-dimensional reconstruction techniques; and

a computer-aided detection subsystem, comprising a plurality of computer-aided detection stages, for analyzing the image data.

23. The system of claim 21, wherein the computed tomography scanning device comprises:

a vacuum housing chamber for generating an electron beam;

a target for receiving the electron beam and emitting x-rays in response to the electron beam; and

a detector array located opposite the target for receiving the emitted x-rays.

24. The system of claim 21, wherein the computed tomography scanning device comprises:

a source ring including a plurality of stationary x-ray sources; and

a detector ring adjacent to the source ring and including a plurality of discrete detector modules.

25. The system of claim 21, wherein the acquisition subsystem is adapted to communicate the view data to the reconstruction subsystem.

26. The system of claim 25, wherein the reconstruction subsystem is adapted to reconstruct the view data into the image data and communicate the image data to the computer-aided detection subsystem.

27. The system of claim 26, wherein the computer-aided detection subsystem is adapted to identify an area of interest within the image data and direct the reconstruction subsystem to reconstruct the image data for the area of interest.

28. The system of claim 21, wherein the acquisition subsystem is adapted to communicate the view data to the computer-aided detection subsystem.

29. The system of claim 28, wherein the computer-aided detection subsystem is adapted to identify an area of interest within the view data and direct the reconstruction subsystem to reconstruct the view data into image data for the area of interest.

30. The system of claim 21, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to reduce artifacts in the acquired information.

31. The system of claim 21, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to vary the voxel size in the image data.

32. The system of claim 21, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to compensate for noise in the acquired information.

33. The system of claim 21, wherein the plurality of reconstruction stages comprises one reconstruction stage including an algorithm adapted to iteratively and statistically reconstruct the acquired information into the image data.

34. The system of claim 21, wherein at least one of the plurality of computer-aided detection stages is in communication with any of the plurality of reconstruction stages.

35. The system of claim 21, wherein the acquisition subsystem comprises an energy discriminating detector adapted to acquire energy sensitive measurements.

36. The system of claim 35, wherein the energy discriminating detector includes an assembly of two or more x-ray attenuating materials the signals from which can be processed in either a photon counting or a charge integration mode.

37. The system of claim 21, wherein the acquisition subsystem comprises at least one detector for detecting x-rays from at least two different incident x-ray energy spectra.

38. The system of claim 21, further comprising an alternative modality subsystem.

39. The system of claim 38, wherein the alternative modality subsystem comprises one or more from the group consisting of a coherent scattering subsystem a quadrupole subsystem, and a trace detection subsystem.

40. The system of claim 21, wherein the transportation means comprises a conveyor belt.

41. A system for detecting an explosive within an article, comprising:

an acquisition subsystem including an x-ray computed tomography scanner for acquiring intensity measurements pertaining to the explosive;

a means for conveying articles to be scanned through the computed tomography scanner;

a reconstruction subsystem, in communication with the acquisition subsystem, for generating view data from the intensity measurements and for reconstructing the view data into image data, wherein said reconstruction subsystem utilizes three-dimensional reconstruction techniques;

a computer-aided detection subsystem for analyzing the image data; and

at least one additional source of information pertaining to the explosive, wherein the image data and the at least one additional source of information assist in identifying the explosive,

wherein the acquisition subsystem acquires image data of the article for three dimensional construction without rotating the articles.

42. The system of claim 41, wherein the at least one additional source of information comprises an energy discriminating detector for discriminating between high and low energy signatures.

43. The system of claim 42, wherein the energy discriminating detector comprises a high-energy sensitive detector and a low energy sensitive detector.

44. The system of claim 42, wherein the energy discriminating detector comprises at least one detector for detecting x-rays from at least two different incident x-ray energy spectra.

45. The system of claim 41, wherein the at least one additional source of information comprises an alternative modality subsystem.

46. The system of claim 45, wherein the alternative modality subsystem comprises one or more from the group consisting of a coherent scattering subsystem, a quadrupole subsystem, and a chemical trace detection subsystem.

47. The system of claim 41, wherein the at least one additional source of information comprises a risk variable subsystem.

48. A method for detecting an explosive within an article, comprising:

acquiring information pertaining to the explosive with an acquisition apparatus having an x-ray computed tomography scanner with a stationary radiation source and a stationary detector;

a means for conveying articles to be scanned through the computed tomography scanner; and

reconstructing an image representative of the explosive based upon the acquired information, wherein said reconstructing includes reconstructing the acquired information into a three-dimensional image;

wherein the acquisition subsystem acquires image data of the articles for three-dimensional reconstruction without rotating the articles.

49. The method of claim 48, wherein the acquiring of information step is accomplished with the computed tomography scanner comprising:

a vacuum housing chamber for generating an electron beam;

a target for receiving the electron beam and emitting x-rays in response to the electron beam; and

a detector array located opposite the target for receiving the emitted x-rays.

50. The method of claim 48, wherein the acquiring of information step is accomplished with the computed tomography scanner comprising:

a source ring including a plurality of stationary x-ray sources; and

a detector ring adjacent to the source ring and including a plurality of discrete detector modules.

51. The method of claim 48, further comprising transporting the article to a location for the acquiring information step.

52. The method of claim 48, wherein the reconstructing an image step comprises subjecting the acquired information to at least one reconstruction technique to form image data representative of the explosive.

53. The method of claim 52, wherein the reconstructing an image step comprises subjecting the acquired information to at least one technique in the group consisting of an algorithm adapted to reduce artifacts in the acquired information, an algorithm adapted to vary the voxel size in the image data, an algorithm adapted to compensate for noise in the acquired information, and an algorithm adapted to iteratively and statistically reconstruct the acquired information into the image.

54. The method of claim 48, further comprising analyzing the reconstructed image to identify the explosive.

55. The method of claim 54, further comprising recomputing area of interest image data.

56. The method of claim 48, further comprising obtaining additional information through an alternative modality subsystem.

57. The method of claim 56, wherein the alternative modality subsystem comprises one or more from the group consisting of a coherent scattering subsystem, a quadrupole subsystem, and a chemical trace detection subsystem.

58. A method for detecting an explosive within an article, comprising:

acquiring information pertaining to an object located within the article with an x-ray computed tomography machine having a stationary radiation source and a stationary detector;

a means for conveying articles to be scanned through the computed tomography scanner;

communicating the acquired information to a plurality of reconstruction modules;

reconstructing the acquired information into image data with the plurality of reconstruction modules, wherein said reconstructing includes reconstructing the acquired information into a three-dimensional image; and

analyzing the image data to identify whether the object is an explosive device;

wherein the acquisition subsystem acquires image data of the articles for three-dimensional reconstruction without rotating the articles.

59. The method of claim 58, wherein the acquiring information step comprises acquiring information with the computed tomography machine comprising:

a vacuum housing chamber for generating an electron beam;

a target for receiving the electron beam and emitting x-rays in response to the electron beam; and

a detector array located opposite the target for receiving the emitted x-rays.

60. The method of claim 58, wherein the acquiring information step is accomplished with the computed tomography machine comprising:

a source ring including a plurality of stationary x-ray sources; and

a detector ring adjacent to the source ring and including a plurality of discrete detector modules.

61. The method of claim 58, wherein the reconstructing the acquired information step comprises reducing artifacts in the image data.

62. The method of claim 58, wherein the reconstructing the acquired information step comprises varying the voxel size in the image data.

63. The method of claim 58, wherein the reconstructing the acquired information comprises compensating for noise in the image data.

64. The method of claim 58, wherein the reconstructing the acquired information comprises iteratively and statistically reconstructing the acquired information into the image.

65. The method of claim 58, further comprising obtaining additional information through an alternative modality subsystem.

66. The method of claim 65, wherein the alternative modality subsystem comprises one or more from the group consisting of a coherent scattering subsystem, a quadrupole subsystem, and a chemical trace detection subsystem.

67. The method of claim 58, further comprising transporting the article to the scanning device with a conveyor belt.

68. A method for detecting an object, comprising:

scanning an article with an x-ray computed tomography machine to acquire information pertaining to the object, wherein the computed tomography machine includes a stationary radiation source and a stationary detector;

a means for conveying articles to be scanned through the computed tomography scanner;

discriminating between high-energy and low-energy signatures;

reconstructing image data representative of the object based upon the high-energy and low-energy signatures, wherein said reconstructing includes reconstructing the information derived from the high-energy and low-energy signatures into a three-dimensional image; and

analyzing the reconstructed image to identify the object;

wherein the acquisition subsystem acquires image data of the articles for three-reconstruction without rotating the article.

69. The method of claim 68, wherein the discriminating step comprises distinguishing between absorption coefficients originating from photoelectric and Compton scatter processes.

70. The method of claim 69, wherein the discriminating step is accomplished with an energy discriminating detector comprising an energy sensitive detector.

71. The method of claim 70, wherein the discriminating step is accomplished with an energy discriminating detector comprising at least one detector adapted to perform measurements by at least two distinctive incident x-ray energy spectra.

72. The method of claim 70, wherein the article is a human body and the object is within the human body.

9. **EVIDENCE APPENDIX**

None.

10. **RELATED PROCEEDINGS APPENDIX**

None.